SPECIFICATION AMENDMENTS

Replace the paragraph beginning at page 4, line 22 with:

In the high-frequency waveguide 112 of Figs. 10-12, high-frequency reflecting areas 108 are disposed in parts as two independent portions in which air columns 104 are regularly arranged in the dielectrics 114 and 116. A high-frequency propagation area 110 is defined as space filled with air. Therefore, a dielectric loss at this portion can be reduced.

Replace the paragraph beginning at page 4, line 28 with:

However, in either case of the high-frequency waveguide 100 of Figs. 7 and 8 and the high-frequency waveguide 112 of Figs. 10-12, it is difficult to carry out the work of forming the desired air columns 110 in the dielectrics. Since the high-frequency propagation area 110 is defined in the space in the high-frequency waveguide 112, it is difficult to carry out dielectric-removing processing. This is not suited to mass production.

Delete the paragraph beginning at page 5, line 15 and replace it with:

According to one aspect of the invention, there is provided a high-frequency waveguide according to the present invention comprising: a first high-frequency reflecting wall including dielectric bars having respective lengths, each dielectric bar comprising a plurality of columnar bodies having respective axes and concentrically varying dielectric constants so that the dielectric constant on the respective axes is lower than the dielectric constant spaced from the respective axes, the dielectric bars of the first high-frequency reflecting wall being disposed in plural layers so that respective axes of the dielectric bars of the first high-frequency reflecting wall describe corners of a regular polygon lying in a plane perpendicular to the axes of the dielectric bars of the first high-frequency reflecting wall; a second high-frequency reflecting wall opposite, spaced from, and parallel to the first high-frequency reflecting wall, with a dielectric interposed between the first and second high-frequency reflecting walls, the second high-frequency reflecting wall including dielectric bars having respective lengths, each dielectric bar of the second high-frequency reflecting wall comprising a plurality of columnar bodies having respective axes and concentrically varying dielectric constants so that the dielectric constant on the respective axes is lower than the dielectric constant spaced from

the respective axes, the dielectric bars of the second high-frequency reflecting wall being disposed in plural layers so that respective axes of the dielectric bars of the second high-frequency reflecting wall describe corners of a regular polygon in a plane perpendicular to the respective axes of the dielectric bars of the second high-frequency reflecting wall; and conductive plates which are opposite each other, with the first and second high-frequency reflecting walls interposed between the conductive plates and end faces of the dielectric bars of the first and second high-frequency reflecting walls connected to the conductive plates.

Replace the paragraph beginning at page 6, line 6 with:

Accordingly, the dielectric bars constitute a photonic crystal structure, and the first and second high-frequency reflecting walls reflect all of high-frequency waves lying in a predetermined frequency band, the high-frequency waves having electric field components orthogonal to the axial directions of the dielectric bars, whereby a high-frequency waveguid~~e can be configured which~~ is produced and has reduced~~ in~~ radiation loss and low~~ in~~ transmission loss. ~~In its turn, a~~ high-frequency waveguide low in transmission loss and inexpensive can b~~e configured~~ manufactured with a simple structure.

Replace the paragraph beginning at page 6, line 18 with:

According to another aspect of the invention, there is provided a method of manufacturing a high-frequency waveguide, including laminating dielectric bars having respective lengths, each dielectric bar comprising a plurality of columnar bodies having respective axes and concentrically varying dielectric constants so that the dielectric constant is lower on the respective axes than spaced from the respective axes, in plural layers so that the respective axes of the dielectric bars describe corners of a regular polygon in a plane perpendicular to the respective axes thereby forming first and second high-frequency reflecting walls; and placing the first and second high-frequency reflecting walls opposite each other, parallel to each other, and spaced from each other, placing conductive plates opposite each other, with the first and second high-frequency reflecting walls interposed between the conductive plates, and connecting the conductive plates to respective end faces of the dielectric bars.

Replace the paragraph beginning at page 7, line 2 with:

Accordingly, a high-frequency waveguide reduced in radiation loss and low in transmission loss can be manufactured in a simple process. ~~In its turn, a~~ The high-frequency waveguide, which has a good ~~in~~ transmission characteristic, can be provided at low cost.

Replace the paragraph beginning at page 13, line 11 with:

Namely, since the arrangements of the alumina cylindrical columns 18 are arrayed to configure the photonic band crystal structure, a method of manufacturing it is simple. Since the interval between crystal lattices of the photonic band crystal structure is on the order of millimeters (mm) in ~~micro~~ microwaves, millimeter waves, and sub-millimeter waves, there is no need to take advantage of a photoengraving technique and an etching technique as distinct from an optical photonic band crystal structure. Simply arranging the alumina cylindrical columns 18 periodically makes it possible to fabricate a photonic band crystal structure and easily manufacture a long-distance high-frequency waveguide which is several tens of centimeters or a few meters in long, for example, thereby allowing mass production.

Replace the paragraph beginning at page 13, line 29 with:

The first dielectric wall 12 and the second dielectric wall 14 of the high-frequency waveguide 10 constitute the photonic band crystal structure wherein the hollow alumina cylindrical columns 18 are arranged in form of the triangular lattice arrays. Thus, each high-frequency wave lying within a frequency band corresponding to the photonic band crystal structure is prohibited from propagating in the first dielectric wall 12 and the second dielectric wall 14. Since, however, the photonic band crystal structure is equivalent to a ~~defective portion under its~~ defect corresponding to a disordered state in the high-frequency propagation area 16, an ~~inputted~~ input high-frequency wave is propagated through the high-frequency propagation area 16.

Replace the paragraph beginning at page 14, line 9 with:

Namely, plane electromagnetic waves having electric field components orthogonal to the axial directions of the alumina cylindrical columns 18 are all reflected with respect to the high-frequency waves in the high-frequency band corresponding to the photonic band

crystal structure. ~~There is thus no other choice but to allow~~ Thus, the high-frequency electromagnetic waves ~~to~~ propagate along the high-frequency propagation area 16. Since the high-frequency propagation area 16 is filled with a dielectric, like air, low in dielectric constant, ~~a~~ transmission loss ~~becomes~~ is low, even in a high-frequency band.

Replace the paragraph beginning at page 14, line 19 with:

A conventionally-known ~~I-type~~ waveguide ~~(tentatively named in this way)~~ ~~wherein~~ in which dielectric bars ~~in which the~~ include peripheries of cylindrical columns having a high ~~in~~ dielectric constant ~~are~~ surrounded ~~with~~ by cylindrical columns having low ~~in~~ dielectric constant, are arranged in a triangular lattice form, is compared with ~~such a II-type~~ a waveguide ~~(tentatively named in this way)~~, as shown in the first embodiment, which constitutes a photonic band crystal structure, with dielectric bars ~~in which the~~ including peripheries of cylindrical columns having a low ~~in~~ dielectric constant ~~are~~ surrounded ~~with~~ by cylindrical columns with a high ~~in~~ dielectric constant, as constituent elements. ~~Thus, in~~ In the ~~conventionally-configured I-type~~ conventional waveguide, a gap is ~~made~~ open to an E ~~wave~~ field (~~whose~~having an orientation of electric field ~~is~~ identical to the axial direction of each dielectric bar). In other words, a frequency band unintended for propagation exists. However, no gap is ~~made~~ open to an H ~~wave~~ field (~~whose~~ having an orientation ~~of electric field corresponds to the direction~~ orthogonal to the axial direction of each dielectric bar). Therefore, the transmission loss increases even if the ~~I-type~~ conventional waveguide ~~forms~~ is a high-frequency waveguide.

Replace the paragraph beginning at page 15, line 7 with:

On the other hand, in the ~~II-type~~ waveguide described in the present embodiment, gaps are set up or ~~made~~ open to the E and H ~~waves~~ fields. Further, in the high-frequency waveguide 10, gaps are ~~made~~ open to the E and H ~~waves~~ fields at a given specific frequency corresponding to each of the lattice intervals of the photonic band crystal structure, and hence a high-frequency waveguide ~~providing~~ with less transmission loss can be ~~configured~~ provided.

Replace the paragraph beginning at page 15, line 14 with:

In the high-frequency waveguide according to the first embodiment as described above, the first dielectric wall 12 and the second dielectric wall 14 are configured with the dielectric bars, like the hollow alumina cylindrical columns 18, as the basic elements. Further, the high-frequency propagation area 16 ~~is formed of the~~ includes a material with a low ~~in~~ dielectric constant. Therefore, a high-frequency waveguide ~~can be configured which is capable of being~~ is provided with reduced ~~in~~ transmission loss, ~~allowing~~ that can be mass ~~production~~ produced in a simple process, and ~~providing~~ that provides low cost and satisfactory transmission efficiency.

Replace the paragraph beginning at page 16, line 13 with:

A method of manufacturing the high-frequency waveguide 30 is basically identical to the method of manufacturing the high-frequency waveguide 10 according to the first embodiment. Upon forming each of the first dielectric wall 12 and the second dielectric wall 14, the metal cylindrical columns 32a may be provided ~~by one layers so~~ as ~~to constitute the~~ triangular lattice arrays together with the alumina cylindrical columns 18 corresponding to the outermost layers of the first and second dielectric walls 12 and 14.

Replace the paragraph beginning at page 16, line 22 with:

The first dielectric wall 12 and second dielectric wall 14 provided on both sides of a high-frequency propagation area 16 prohibit the propagation of high-frequency waves lying within a frequency band corresponding to a photonic band crystal structure. Namely, plane electromagnetic waves having electric field components orthogonal to the axial directions of the alumina cylindrical columns 18 are all reflected with respect to the high-frequency waves in the frequency band corresponding to the photonic band crystal structure. There ~~is thus no other choice but to allow the~~ high-frequency electromagnetic waves ~~to~~ propagate along the high-frequency propagation area 16.

Replace the paragraph beginning at page 17, line 19 with:

Namely, the high-frequency waveguide according to the second embodiment is provided with the low-loss waveguide walls which reflect even the electric field components

parallel to the axial directions of the alumina cylindrical columns 18 constituting the photonic band crystal structure as well as the electric field components lying in the direction orthogonal to the axial direction of each of the alumina cylindrical columns 18. Consequently, a waveguide can be configured which is free of the leakage of a high-frequency wave and low in loss. ~~In its turn, a~~ A high-frequency waveguide, which is low in cost and provides satisfactory transmission efficiency, can be constructed.

Delete the paragraph beginning at page 18, line 3 and replace it with:

The high-frequency waveguide according to the present invention comprises a first high-frequency reflecting wall including dielectric bars having respective lengths, each dielectric bar comprising a plurality of columnar bodies having respective axes and concentrically varying dielectric constants so that the dielectric constant on the respective axes is lower than the dielectric constant spaced from the respective axes, the dielectric bars of the first high-frequency reflecting wall being disposed in plural layers so that respective axes of the dielectric bars of the first high-frequency reflecting wall describe corners of a regular polygon lying in a plane perpendicular to the axes of the dielectric bars of the first high-frequency reflecting wall; a second high-frequency reflecting wall opposite, spaced from, and parallel to the first high-frequency reflecting wall, with a dielectric interposed between the first and second high-frequency reflecting walls, the second high-frequency reflecting wall including dielectric bars having respective lengths, each dielectric bar of the second high-frequency reflecting wall comprising a plurality of columnar bodies having respective axes and concentrically varying dielectric constants so that the dielectric constant on the respective axes is lower than the dielectric constant spaced from the respective axes, the dielectric bars of the second high-frequency reflecting wall being disposed in plural layers so that respective axes of the dielectric bars of the second high-frequency reflecting wall describe corners of a regular polygon in a plane perpendicular to the respective axes of the dielectric bars of the second high-frequency reflecting wall; and conductive plates which are opposite each other, with the first and second high-frequency reflecting walls interposed between the conductive plates and end faces of the dielectric bars of the first and second high-frequency reflecting walls connected to the conductive plates. The dielectric bars constitute a photonic crystal structure. The first and second high-frequency reflecting walls reflect all of high-frequency waves lying in a predetermined frequency band, the high frequency waves having electric field components orthogonal to the axial directions of the dielectric bars,

whereby a high-frequency waveguide can be produced with reduced radiation loss and low transmission loss. A high-frequency waveguide low in transmission loss and inexpensive to manufacture can be produced with a simple structure.

Replace the paragraph beginning at page 19, line 1 with:

Further, the dielectric bars are shaped in the form of cylinders. The shapes of the dielectric bars corresponding to the constituent elements of the first and second high-frequency reflecting walls can be simplified. ~~In its turn, a~~ A simpler and cheaper high-frequency waveguide can be ~~configured~~ provided.

Replace the paragraph beginning at page 19, line 6 with:

Furthermore, the dielectric bars are shaped in hollow form. A material low in dielectric constant, on the axial center side of each dielectric bar is set up as air, so that the construction of the dielectric bar can be simplified. ~~In its turn, a~~ A low-cost high-frequency waveguide ~~can be configured~~ with a simple structure is provided.

Replace the paragraph beginning at page 19, line 12 with:

Still further, since the dielectric lying between the first high-frequency reflecting wall and the second high-frequency reflecting wall is ~~used as~~ air, the transmission loss can be reduced with a simple structure. ~~In its turn, an~~ An inexpensive high-frequency waveguide low in transmission loss ~~can be configured~~ with a simple structure is provided.

Replace the paragraph beginning at page 19, line 18 with:

Still further, metal walls are further provided outside the dielectric bars corresponding to the outermost layers of the first and second high-frequency reflecting walls. The metal walls are capable of reflecting high-frequency waves having electric field components parallel to the axial directions of the dielectric bars. ~~In its turn, a~~ A high-frequency waveguide with reduced ~~in the~~ leakage of the high-frequency ~~wave~~ waves and good in transmission efficiency ~~can be configured~~ is provided.

Replace the paragraph beginning at page 19, line 26 with:

Still further, the metal walls are made up of metal bar arrays in which metal bars identical in length to dielectric bars are disposed along the dielectric bars. Each of the metal walls can be brought to a simple configuration easy to lay out along each dielectric bar. ~~In its turn, a~~ A high-frequency waveguide low in cost and good in transmission efficiency ~~can be configured~~ is provided.

Delete the paragraph beginning at page 20, line 1 and replace it with:

A method of manufacturing a high-frequency waveguide, according to the present invention, includes laminating dielectric bars having respective lengths, each dielectric bar comprising a plurality of columnar bodies having respective axes and concentrically varying dielectric constants so that the dielectric constant is lower on the respective axes than spaced from the respective axes, in plural layers so that the respective axes of the dielectric bars describe corners of a regular polygon in a plane perpendicular to the respective axes, thereby forming first and second high-frequency reflecting walls; and placing the first and second high-frequency reflecting walls opposite each other, parallel to each other, and spaced from each other, placing conductive plates opposite each other, with the first and second high-frequency reflecting walls interposed between the conductive plates, and connecting the conductive plates to respective end faces of the dielectric bars. A high-frequency waveguide reduced in radiation loss and low in transmission loss can be manufactured in a simple process. A high-frequency waveguide good in transmission characteristic can be provided at low cost.

Replace the paragraph beginning at page 20, line 21 with:

The method further includes ~~a step for~~ forming metal walls outside the dielectric bars corresponding to the outermost layers of the first and second high-frequency reflecting walls. A high-frequency waveguide capable of reflecting each high-frequency wave having electric field components parallel to the axial directions of the dielectric bars can be manufactured in a simple process. ~~In its turn, a~~ A high-frequency waveguide reduced in ~~the~~ leakage of the high-frequency wave and good in transmission characteristic can be provided at a low cost.